CLAIMS

What is claimed is:

1. A method of determining distortion in a circuit image, comprising:
   measuring photon emissions for a potential photon emission area;
   comparing the expected level of photon emission with the measured photon emissions; and
   predicting an amount of spatial distortion for the potential photon emission areas based on results of comparing the measured photon emissions to the expected photon emission level.

2. The method of claim 1, further comprising defining the potential photon emission area using a layout database.

3. The method of claim 2, further comprising determining the expected level of photon emissions over the potential photon emission areas defined by the layout database.

4. The method of claim 1, further comprising implementing a probability density function (PDF) to predict the amount of spatial distortion.

5. The method of claim 4, further comprising implementing a Laplace distribution as the PDF.

6. The method of claim 4, further comprising determining a cumulative distribution function (CDF) by convolving the expected level of photon emission with the PDF.

7. The method of claim 6, further comprising approximating the measured photon emissions using the CDF.

8. The method of claim 1, further comprising representing the measured photon emissions using vectors of unequal length to reduce mathematical computations.

9. The method of claim 1, wherein predicting the amount of spatial distortion comprises using a Non-Homogenous Poisson Process (NHPP).

10. The method of claim 1, further comprising modeling background photon phenomena by defining a photon emission area for each phenomena.

11. The method of claim 10, further comprising modeling a dark current of the circuit image with coordinates of the defined photon emission area.

12. The method of claim 1, further comprising forming a composite time-spatial distortion model by weighting the amount of spatial distortion by a time distortion model.

13. The method of claim 12, wherein the spatial distortion and the time distortion model are mutually independent.

14. The method of claim 12, wherein forming the composite time-spatial distortion model comprises evaluating:

$$\int_{-\infty}^{\infty} \lambda_E(t-s)\cdot\psi(s)ds\cdot f(x,E_x)\cdot f(y,E_y)$$

wherein the expression $\lambda_E(t\text{-}s)\psi(s)$ represents time distortion, $f(x, E_x)$ represents a probability density function (PDF) in the X direction of a circuit image, and $f(y, E_y)$ represents the PDF in the Y direction in the circuit image.

15. The method of claim 1, further comprising improving resolution of the circuit image by approximating a photon intensity of adjacent spaced devices.

16. A system for determining distortion in a circuit image, comprising:

a storage module comprising a layout database that determines potential photon emission areas;

a processing module coupled to the storage module and configured to determine an expected level of photon emissions over the potential photon emission areas; and

an imaging photomultiplier coupled to the processing module and configured to measure photon emissions for the potential photon emission areas;

wherein the processing module compares the expected level of photon emissions to the measured photon emissions and produces a mathematical model that predicts an amount of spatial distortion for each potential photon emission area.

17. The system of claim 16, wherein the processing module evaluates a probability density function (PDF) that approximates the amount of spatial distortion is contained in the circuit image.

18. The system of claim 17, wherein the PDF evaluated by the processing module is an exponential-power distribution.

19. The system of claim 18, wherein a cumulative distribution function (CDF) is determined by convolving the expected level of photon emission with the PDF.

20. The system of claim 17, wherein the processing module evaluates a composite time-spatial distortion model comprising a spatial distortion model and a time distortion model, wherein the spatial distortion model and the time distortion model are each described using NHPPs.

21. The system of claim 17, further comprising a photon emission area designated for each phenomenon in a circuit image, and wherein the photon emission area comprises background photon phenomena.

22. The system of claim 16, wherein the processing module adaptively represents the photon emissions with vectors of unequal length to reduce mathematical computations.

23. A system for determining distortion in a circuit image, comprising:

a storing means for determining potential photon emission areas from a layout database;

a processing means for determining an expected level of photon emissions over the potential photon emission areas; and

a comparing means for comparing the expected level of photon emissions to a measured level of photon emissions for the potential photon emission areas.

24. The system of claim 23, further comprising predicting means for predicting an amount of spatial distortion for each potential photon area.